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# Kramer Electronics, Ltd.

# USER MANUAL

## Model:

**FC-7402**

***SDI to Analog Converter***

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# 1 Introduction

Welcome to Kramer Electronics (since 1981): a world of unique, creative and affordable solutions to the infinite range of problems that confront the video, audio and presentation professional on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better! Our 350-plus different models now appear in 8 Groups[1], which are clearly defined by function.

Congratulations on purchasing your Kramer **FC-7402** *SDI to Analog Converter*, which is ideal for broadcast and production video studios, postproduction and duplication studios, and non-linear editing.

The package includes the following items:

- **FC-7402** *SDI to Analog Converter*
- Power supply
- Null-modem adapter
- This user manual[2]
- Kramer concise product catalog/CD

# 2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual
- Use Kramer high performance high resolution cables[3]

# 3 Overview

The high quality **FC-7402** is a multi-standard, adjustment-free digital to analog converter designed to accept a standard resolution SDI (4:2:2 serial digital video) input, provide a reclocked and equalized SDI output, and convert to professional quality analog outputs in the common signal formats:

- Composite video

1 GROUP 1: Distribution Amplifiers; GROUP 2: Video and Audio Switchers, Matrix Switchers and Controllers; GROUP 3: Video, Audio, VGA/XGA Processors; GROUP 4: Interfaces and Sync Processors; GROUP 5: Twisted Pair Interfaces; GROUP 6: Accessories and Rack Adapters; GROUP 7: Scan Converters and Scalers; and GROUP 8: Cables and Connectors

2 Download up-to-date Kramer user manuals from the Internet at this URL: http://www.kramerelectronics.com/manuals.html

3 The complete list of Kramer cables is on our Web site at http://www.kramerelectronics.com (click “Cables and Connectors” in the Products section)


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- s-video (Y/C)
- RGsB or YUV[1]

In addition, the **FC-7402**:

- Includes full ProcAmp control of the video via the front panel and 7-segment display, and via RS-232, with the option to store the settings in non-volatile memory
- Has an internal 75% color bar generator, whose timing is based on the SDI input
- Encodes 525 line signals to NTSC3.58 or NTSC4.43, and 625 lines to PAL-B, D, G, H, I or Combination PAL-N. When encoding NTSC, it can be programmed with or without a 7.5 IRE setup (pedestal)
- Can be controlled via a user-friendly Windows® based program that can modify parameters such as hue, contrast, brightness, sharpness, and color
- Lets you store/recall up to 10 setups in non-volatile memory

To achieve the best performance:

- Connect only good quality connection cables, thus avoiding interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Avoid interference from neighboring electrical appliances that may adversely influence signal quality
- Position your Kramer **FC-7402** in a location free from moisture and away from excessive sunlight and dust

## 4 Your FC-7402 SDI to Analog Converter

Figure 1, Table 1, and Table 2 define the **FC-7402**:

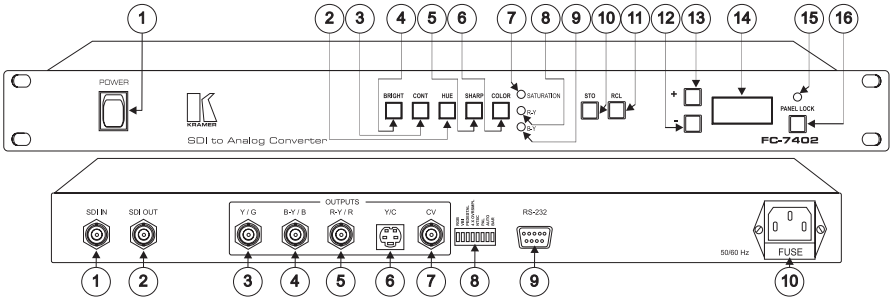


*Figure 1: FC-7402 SDI to Analog Converter*

1 Sometimes called Y, B-Y, R-Y or Y, Pb, Pr


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*Table 1: Front Panel FC-7402 SDI to Analog Converter*

| # | Feature | Function |
|---|---|---|
| 1 | *POWER* Switch | Illuminated switch supplying power to the unit |
| 2 | *HUE* Button | Press the *HUE* button and adjust using the + and – buttons |
| 3 | *CONT* (*CONTRAST)* Button | Press the CONT button and adjust using the + and – buttons |
| 4 | *BRIGHT (BRIGHTNESS)* Button | Press the *BRIGHT* button and adjust using the + and – buttons |
| 5 | *SHARP* Button | Press the *SHARP* button and adjust using the + and – buttons |
| 6 | *COLOR* Button | Cycles between SATURATION, R-Y, and B-Y. The corresponding LED lights |
| 7 | SATURATION LED | Lights after selecting SATURATION via the COLOR button |
| 8 | R-Y LED | Lights after selecting R-Y via the COLOR button |
| 9 | B-Y LED | Lights after selecting B-Y via the COLOR button |
| 10 | *STO* Button | Stores the current setup in the non-volatile memory |
| 11 | *RCL* Button | Recalls a setup from the non-volatile memory |
| 12 | - Button | Press to decrease |
| 13 | + Button | Press to increase |
| 14 | 7-segment Display | Displays data when using a front panel button; briefly displays firmware version when machine is turned on |
| 15 | *PANEL LOCK* LED | Illuminates when the panel is locked (blinks after pressing a button when the panel is locked) |
| 16 | *PANEL LOCK* Button | Engages/disengages the front panel buttons |

*Table 2: Rear Panel FC-7402 SDI to Analog Converter*

| # | Feature | Function |
|---|---|---|
| 1 | SDI IN BNC Connector | Connects to the SDI source |
| 2 | SDI OUT BNC Connector | Connects to the reclocked and equalized SDI acceptor |
| 3 | Y / G OUTPUTS BNC Connector | Connects to the RGB[1] or component[2] video acceptor |
| 4 | B-Y / B OUTPUTS BNC Connector | |
| 5 | R-Y / R OUTPUTS BNC Connector | |
| 6 | YC OUTPUT 4p Connector | Connects to the s-Video (Y/C) output |
| 7 | CV OUTPUTS BNC Connector | Connects to the composite video output |
| 8 | Dipswitches | Dipswitches setup (see section 5.1.2) |
| 9 | RS-232 Port | Connects to the PC or the Remote Controller |
| 10 | Power Connector with Fuse | AC connector enabling power supply to the unit |

# 5 Using Your FC-7402 SDI to Analog Converter

You can use your **FC-7402**, to convert SDI video to professional quality analog video—composite video, s-Video and component[3] (YUV or RGB) video—as the example in Figure 2 illustrates.

1 For RGB video, connect all 3 connectors: G, B, and R

2 For component video, connect all 3 connectors: Y, B-Y, and R-Y

3 Y, B-Y, R-Y is also known as Y, Pb/Cb, Pr/Cr, or YUV or Y, Pb, Pr


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## 5.1 Connecting the FC-7402 SDI to Analog Converter

To connect[1] the **FC-7402**, do the following:

1. Connect the SDI source (for example, a digital camera) to the SDI IN BNC connector. You can also connect (OPTIONAL) the SDI OUT BNC connector to an SDI acceptor (for example, an SDI monitor).

2. Connect the CV OUTPUT BNC connector to a composite video acceptor (for example, a composite video monitor).

3. Connect the Y/C OUTPUT 4p connector to an s-Video acceptor (for example, an s-Video monitor).

4. Connect the component video OUTPUT BNC connectors, Y / G, B-Y / B, and R-Y / R to **either** a YUV **or** an RGB video acceptor, as follows:
   - A BETACAM VCR (YUV) to **Y** / G, **B-Y** / B, and **R-Y** / R (DIP 1 OFF), **or**
   - A plasma monitor (RGB) to Y / **G**, B-Y / **B**, and R-Y / **R** (DIP 1 ON)

5. Connect a PC or other controller, if required (see section 5.1.1).

6. Set the dipswitches (see section 5.1.2).

7. Connect the AC power cord.

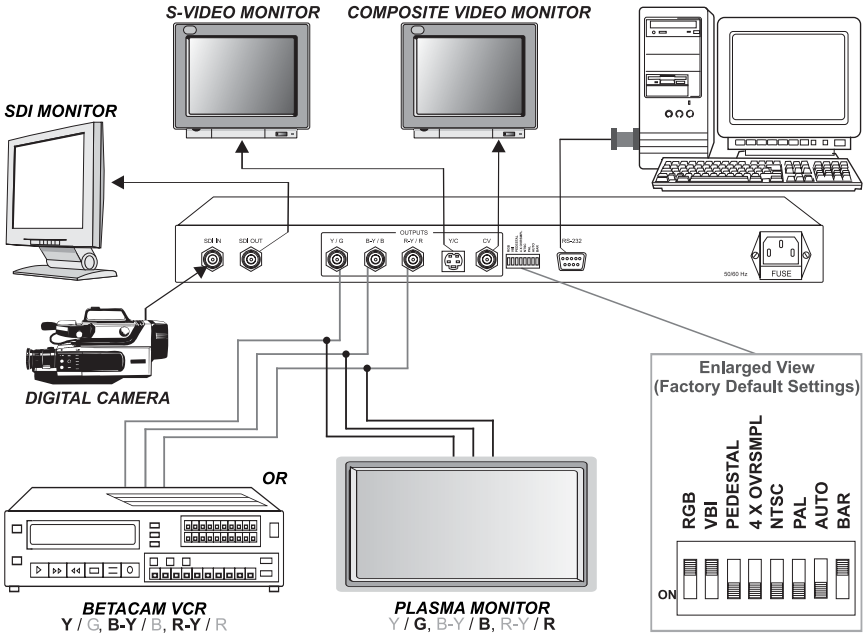


*Figure 2: Connecting an FC-7402 SDI to Analog Converter*

1 When only one output is required, connect that output of the FC 7402, and leave the other outputs unconnected


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### 5.1.1 Connecting a PC

To connect a PC to the **FC-7402** unit, using the Null-modem adapter provided with the machine (recommended):

- Connect the RS-232 DB9 rear panel port on the **FC-7402** unit to the Null-modem adapter and connect the Null-modem adapter with a 9 wire flat cable to the RS-232 DB9 port on your PC

To connect a PC to the **FC-7402** unit, without using a Null-modem adapter:

- Connect the RS-232 DB9 port on your PC to the RS-232 DB9 rear panel port on the **FC-7402** unit, as Figure 3 illustrates (depending on whether the PC has a 9-pin or 25-pin connector)

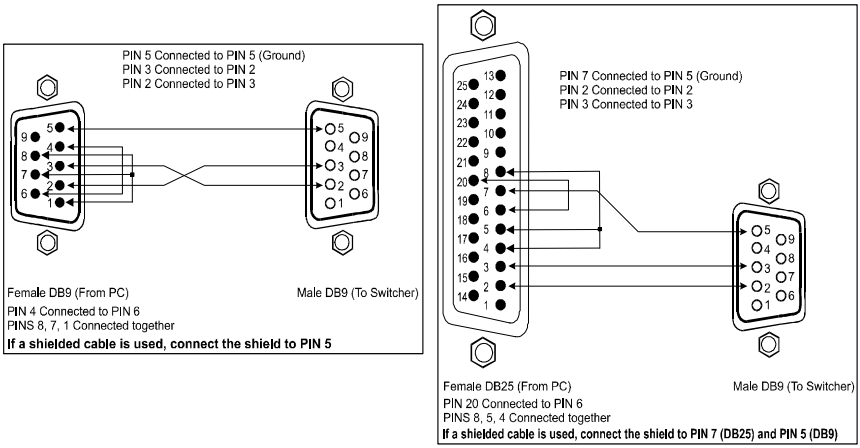
PIN 5 Connected to PIN 5 (Ground)
PIN 3 Connected to PIN 2
PIN 2 Connected to PIN 3
Female DB9 (From PC)
Male DB9 (To Switcher)
PIN 4 Connected to PIN 6
PINS 8, 7, 1 Connected together
If a shielded cable is used, connect the shield to PIN 5
PIN 7 Connected to PIN 5 (Ground)
PIN 2 Connected to PIN 2
PIN 3 Connected to PIN 3
Female DB25 (From PC)
Male DB9 (To Switcher)
PIN 20 Connected to PIN 6
PINS 8, 5, 4 Connected together
If a shielded cable is used, connect the shield to PIN 7 (DB25) and PIN 5 (DB9)

*Figure 3: Connecting a PC without using a Null-modem Adapter*


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### 5.1.2 Dipswitch Settings

Configure the **FC-7402** unit by setting the 8 dipswitches, as Table 3 defines:

*Table 3: Dipswitch Definitions*

| Dipswitch | | Set as follows: |
|---|---|---|
| 1 | RGB | ON for RGB, OFF for YUV |
| 2 | VBI[1] | ON to enable Vertical Interval Blanking; OFF to disable |
| 3 | PEDESTAL[2] | ON for pedestal (7.5 IRE offset selection for NTSC); OFF for no pedestal |
| 4 | 4XOVRSMPL | ON to enable oversampling[3]; OFF to disable oversampling<br>For 2 X OVRSMPL (see section 5.1.3) |
| 5 | NTSC | ON for NTSC 3.58 (see Table 4) |
| 6 | PAL | ON for PAL-B (see Table 4) |
| 7 | AUTO | ON for multi-standard; OFF for user-selected (fixed) standard (see Table 4) |
| 8 | BAR | ON for machine to operate as a 75% color bar generator (based on the clock of the SDI input) |

*Table 4: Dipswitch Settings (AUTO, PAL, and NTSC)*

| AUTO | PAL | NTSC | FC-7402 Output Standard |
|---|---|---|---|
| OFF | OFF | OFF | NTSC 4.43 |
| OFF | OFF | ON | NTSC 3.58 |
| OFF | ON | OFF | PAL-B |
| OFF | ON | ON | PAL-N |
| ON | OFF | OFF | PAL-N for 625 line SDI input; NTSC 4.43 for 525 line SDI input |
| ON | OFF | ON | PAL-N for 625 line SDI input; NTSC 3.58 for 525 line SDI input |
| ON | ON | OFF | PAL-B for 625 line SDI input; NTSC 4.43 for 525 line SDI input |
| ON | ON | ON | PAL-B for 625 line SDI input; NTSC 3.58 for 525 line SDI input |

1 For example, passing data such as Teletext

2 NTSC offsets the black level within the active video signal by 7.5 IRE when selected

3 When a signal is digitally sampled at frequencies much higher than the NYQUIST frequency. When this method is used, the noise figure is improved


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### 5.1.3 Adjusting Oversampling to x2 (Moving Jumper JMP1)

Setting DIP 4 ON enables oversampling[1], which provides the picture with a better S/N ratio. The default is x4 (recommended). However, you can adjust this factory preset to 2 X OVRSMPL.

To adjust oversampling to x2, do the following:

1. Set DIP 4 OFF and remove the power cord.
2. Open the **FC-7402** unit and move Jumper JMP1 to the left (see Figure 4).
3. Close the **FC-7402** unit, set DIP 4 ON and connect the power cord to the mains electricity.

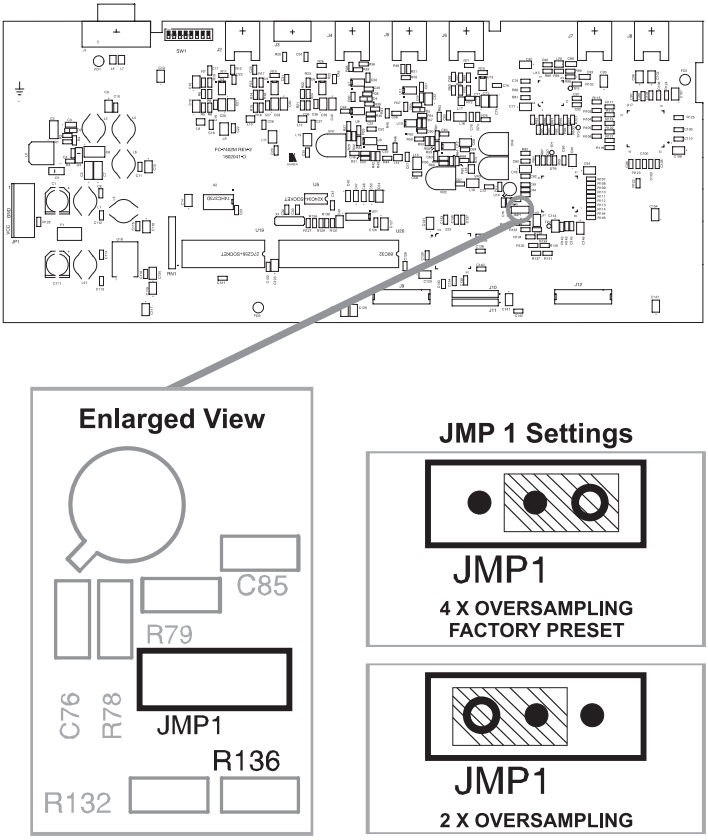


*Figure 4: Adjusting Oversampling to x2 (Moving Jumper JMP1)*

1 When a signal is digitally sampled at frequencies much higher than the NYQUIST frequency. When this method is used, the noise figure is improved


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## 5.2 Operating the FC-7402 SDI to Analog Converter

Operate your **FC-7402** via:

- The front panel buttons
- RS-232 serial commands transmitted by a touch screen system, PC, or other serial controller

To operate the **FC-7402** using the front panel buttons, do the following:

1. Turn on the power.

The signal from the SDI source is automatically converted to composite video, s-Video, and component video (YUV if DIP 1 is set to OFF, or RGB if DIP 1 is set to ON).

2. If necessary, adjust the brightness, contrast, hue, sharpness, and/or color of the picture, as follows:

- Press the appropriate button[1]

The button illuminates and the 7-segment display shows the current level (in digits)

- Press and release the + button or - button once to gradually increase or decrease the current level by one unit

The 7-segment display shows the new level

Note: To increase or decrease the current level rapidly, press and hold down the + button or - button, continuously[2]. To end the rapid adjustment, release the + button or – button.

### 5.2.1 Storing/Recalling Setups

You can store and recall up to 10 setups (or adjustments) in non-volatile memory, using the STO and RCL buttons together with the + and – buttons.

To store[3] a setup, do the following:

- Press the STO button and then select a setup # between 1 and 10 by pressing the + and – buttons
- Press the STO button again

The current settings are saved to that setup #

To recall a setup, do the following:

- Press the RCL button and then select the appropriate # (that corresponds to the setup #) by pressing the + and – buttons
- Press the RCL button again

The selected setup is recalled

1 See items 2 to 6 in Table 1

2 The 7-segment display starts to quickly scan the range. When it stops running, it has reached the maximum or minimum, respectively

3 Storing a new setup over a previous setup # replaces the previous setup #


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### 5.2.2 Locking the Front Panel

To prevent changing the settings accidentally or tampering with the front panel, lock your **FC-7402**. Unlocking releases the protection mechanism.

To lock the **FC-7402**:

- Press the PANEL LOCK button (for about 2 seconds) until the PANEL LOCK LED illuminates freezing the front panel controls. Pressing a button will have no effect[1], except to cause the PANEL LOCK LED to blink[2] and show the value of a ProcAmp setting if its button is pressed[3]

To unlock the **FC-7402**:

- Press the PANEL LOCK button (for about 2 seconds) until the front panel controls unlock and the PANEL LOCK LED no longer illuminates

## 6 Technical Specifications

Table 5 includes the technical specifications:

*Table 5: Technical Specifications[4] of the FC-7402 SDI to Analog Converter*

| | |
|---|---|
| INPUT: | 1 SDI: SMPTE - 259M, ITU-R BT.601 (CCIR-601) 75Ω on a BNC connector |
| OUTPUTS: | 1 composite video - 1Vpp/75Ω on a BNC connector<br>1 YC - 1Vpp/75Ω (Luma), 0.3Vpp/75Ω (Chroma) on a 4p connector<br>1 component - RGB / Y, R-Y, B-Y (1V, 0.7V, 0.7V/75Ω) on BNC connectors<br>1 SDI (reclocked): SMPTE - 259M, ITU-R BT.601 (CCIR-601) 75Ω on a BNC connector |
| RESOLUTION: | 10-bit |
| BANDWIDTH: | <0.5dB up to 5MHz, Fully Loaded |
| NON-LINEARITY: | <+/-1.0% |
| DIFF. GAIN: | 0.11% (NTSC) |
| DIFF. PHASE: | 0.33 deg (NTSC) |
| K-FACTOR: | 0.3% |
| S/N RATIO: | 67dB unweighted |
| YC DELAY: | <20ns |
| EQUALIZATION: | >125m for Belden 8281 cable |
| CONTROLS: | RS-232 and front panel: brightness, contrast, color (saturation and separate U, V), hue, and sharpness. Front panel lock |
| POWER SOURCE: | 230 VAC, 50/60 Hz, (115 VAC, USA) 13.8 VA |
| DIMENSIONS: | 19 inch (W), 7 inch (D), 1U (H) rack mountable |
| WEIGHT: | 2.6 kg. (5.7 lbs.) approx. |
| ACCESSORIES: | Power cord |

1 Nevertheless, even though the front panel is locked you can still operate your PC control software

2 Warning that you need to unlock to regain control via the front panel

3 For example, if the HUE button is pressed when the panel is locked, then the 7-segment display will illuminate the current value of the HUE setting

4 Specifications are subject to change without notice


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# 7 Communication Protocol[1]

RS-232 communication between the FC-7402 and the PC is done using the following protocol. The protocol uses four bytes of information, and data is at 9600 baud, no parity, 8 data bits and 1 stop bit. The controller and machine should be connected via a null-modem connection, that is, if using a DB-9 port, connect as follows:
Connect pin 5 of the PC to pin 5 of the machine
Cross pins 2 and 3, i.e., connect pin 2 of the PC to pin 3 of the machine, and connect pin 3 of the PC to pin 2 of the machine
On the PC side, short pins 4 and 6
On the PC side, short pins 1, 7 and 8

*Table 6: Structure of the Protocol*

| **MSB** | | | | | | | **LSB** |
|---|---|---|---|---|---|---|---|
| | | **INSTRUCTION** | | | | | |
| 0 | TO PC | I5 | I4 | I3 | I2 | I1 | I0 |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 1st byte | | | | | | | |
| | **DATA** | | | | | | |
| 1 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 2nd byte | | | | | | | |
| | **EXTENDED DATA** | | | | | | |
| 1 | E6 | E5 | E4 | E3 | E2 | E1 | E0 |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 3rd byte | | | | | | | |
| | **MSB's** | | | | | | **ADDR** |
| 1 | E7 | D7 | 0 | 1 | 1 | 1 | 0 |
| 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| 4th byte[2] | | | | | | | |

Note that the MSB's of the DATA (D7) and the EXTENDED DATA (E7) are in the fourth byte. Terminology:
TO PC is the "DESTINATION BIT"
I4..I0 is the "INSTRUCTION"
D7..D0 is the "DATA"
E7..E0 is the "EXTENDED DATA"
The destination bit, TO PC, is 0 when sending from the PC to the machine, or 1 when sending from the machine to the PC.

*Table 7: Instruction Set for the FC-7402*

| **INSTRUCTION** | | | **I7** | **I6** | **I5** | **I4** | **I3** | **I2** | **I1** | **I0** |
|---|---|---|---|---|---|---|---|---|---|---|
| **Dec** | **Hex** | | | | | | | | | |
| 0 | 0 | Reset | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 3 | 3 | Store machine settings | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 4 | 4 | Recall machine settings | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| 5 | 5 | Set Video Parameter | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| 6 | 6 | Request Video Parameter | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| 7 | 7 | Read video encoder data | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
| 8 | 8 | Write video encoder data | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| 10 | A | Write EEPROM data | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 |
| 11 | B | Read EEPROM data | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 |
| 12 | C | Write I²C | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| 13 | D | Read I²C | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 |
| 14 | E | Read video standard | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| 15 | F | Is setup defined? | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 16 | 10 | Error | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| 30 | 1E | Lock Front Panel | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 |
| 31 | 1F | Request Bar | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 |
| 57 | 39 | Enable "Power-down save" | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 |
| 61 | 3D | Identify machine | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 1 |

1 VER-0.1

2 Note that the MSB's of the DATA (D7) and the EXTENDED DATA (E7) are in the fourth byte


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**DESCRIPTION OF INSTRUCTIONS**

**INSTRUCTION 0 – RESET**

DATA=0: initialize the machine.
When the machine is initialized, it will send the RESET code (DATA = 0). If the machine receives this code, it will reset to its "power-up" state.
DATA=1: configure the machine to its factory default state.
When the machine receives this code, all programmable parameters will be reset to their factory-default values.
EXTENDED DATA - set as 0.

**INSTRUCTION 3 – STORE MACHINE SETTINGS**

DATA = setup# (1 to 10) where present values of machine settings are saved.
EXTENDED DATA - set as 0.
- When the machine receives this instruction, its present settings (video parameters) are saved in non-volatile memory. The machine replies by sending the same 4 bytes (except for the Destination Bit) back to the PC.
- When the user saves the machine settings using the front-panel buttons, then this instruction is sent to the PC.

**INSTRUCTION 4 – RECALL MACHINE SETTINGS**

DATA = setup# (1 to 10) of machine settings which are to recalled.
EXTENDED DATA - set as 0.
- When the machine receives this instruction, it recalls the settings which were previously saved in the setup#. The machine replies by sending the same 4 bytes (except for the Destination Bit) back to the PC.
- When the user recalls a setup using the front-panel buttons, then this instruction is sent to the PC.

**INSTRUCTION 5dec – SET VIDEO PARAMETER**

DATA = Video parameter #, defined as follows:
1 = Brightness
2 = Contrast
3 = Hue
4 = Sharpness
5 = Colour saturation
6 = R-Y saturation
7 = B-Y saturation
EXTENDED DATA - value for selected video parameter .
- When the machine receives this instruction, then, if valid, the selected video parameter is set and the machine replies by sending the same 4 bytes (except for the Destination Bit) back to the PC.
- When the user changes video parameters using the front-panel buttons, then this instruction is sent to the PC.
Note that the video parameter values range from 0 (minimum) up to 255dec (maximum), and do not necessarily correspond with the number displayed on the panel of the FC-7402. If a value outside the legal range of a particular parameter is sent, the error code will be returned.

**INSTRUCTION 6 – REQUEST VIDEO PARAMETER**

For sending to machine, DATA = VIDEO parameter #, defined as in INSTRUCTION 5; EXTENDED DATA=0;
When replying DATA = VIDEO parameter #, defined as in INSTRUCTION 5; EXTENDED DATA- value for selected VIDEO parameter.

**INSTRUCTION 7 – READ VIDEO ENCODER DATA**

For sending to machine, DATA = VIDEO ENCODER sub-address which is to be read.
When replying:- DATA = VIDEO ENCODER sub-address; EXTENDED DATA = requested data.
The PC sends this instruction to the machine. The machine replies by sending back the data assigned to this sub-address.

**INSTRUCTION 8 – WRITE VIDEO ENCODER DATA**

DATA = VIDEO ENCODER sub-address; EXTENDED DATA = data to be written to this sub-address.
The PC sends data directly to the encoder. The machine implements this new value, and replies by sending the same 4 bytes (except for the Destination Bit) back to the PC.
CAUTION – this function was designated for development and testing purposes. Improper use of this function may cause erratic behaviour of the machine.

**INSTRUCTION 10dec – WRITE EEPROM DATA**

DATA = EEPROM sub-address; EXTENDED DATA = data to be written to this sub-address.
The PC sends data directly to the EEPROM. The EEPROM stores this new value, and replies by sending the same data back to the PC.


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CAUTION – this function was designated for development and testing purposes. Improper use of this function may cause erratic behaviour of the machine.

**INSTRUCTION 11dec – READ EEPROM DATA**

For sending to machine, DATA = EEPROM sub-address which is to be read.
When replying:- DATA = EEPROM sub-address; EXTENDED DATA = requested data.
The PC sends this instruction to the machine. The machine replies by sending back the data stored in this sub-address.

**INSTRUCTION 12dec – WRITE I²C**

DATA = I²C sub-address; EXTENDED DATA = data to be written to this sub-address. The PC sends I²C data (to the I²C address which was last accessed via INSTRUCTION 13). The machine replies by sending the same data back to the PC.
CAUTION – this function was designated for development and testing purposes. Improper use of this function may cause erratic behavior of the machine.

**INSTRUCTION 13dec – READ I²C**

For sending to machine, DATA = I²C address; EXTENDED DATA = sub-address. When replying:- DATA = sub-address; EXTENDED DATA = data read.
The PC sends this instruction to the machine. The machine replies by sending back the data of this address and sub-address.

**INSTRUCTION 14dec – READ VIDEO STANDARD**

For sending to machine, set DATA = EXTENDED DATA = 0.
When replying:- DATA = 0; EXTENDED DATA = VIDEO STANDARD.
The PC sends this instruction to the machine. The machine replies by sending back the video standard, defined as follows:
0 = NTSC4.43
1 = NTSC
2 = PAL
3 = PAL-N
64dec (40hex)= Invalid or no input detected
Note that when the DIP-switches are set for a fixed standard, the FC-7402 will reply by sending the code for the fixed standard.

**INSTRUCTION 16dec – ERROR**

If the machine receives an invalid instruction, it replies by sending this error code.

**INSTRUCTION 30dec – LOCK FRONT PANEL**

DATA = 0: panel is unlocked.
DATA = 1: panel is locked.
EXTENDED DATA - set as 0.
- When the machine receives this instruction, it will lock or unlock the panel for control via the front-panel pushbutton switches (RS-232 control is unaffected).
- When the user changes the lock status using the front-panel button, then this instruction is sent to the PC.

**INSTRUCTION 31dec – REQUEST BAR**

For sending DATA = EXTENDED DATA = 0
When replying EXTENDED DATA = 1, if Bar

**INSTRUCTION 57dec – ENABLE "POWER-DOWN SAVE"**

DATA = 0 disables power-down saving; DATA = 1 enables saving. EXTENDED DATA - set to 0.
The PC sends this instruction to the machine. The power-down option is enabled or disabled according to the value of DATA. If the power-down option is enabled, then the machine will "remember" its state before being turned off, and revert to this state when turned on again. Note that whenever the machine is turned on, the power-down save option is enabled.

**INSTRUCTION 61dec – IDENTIFY MACHINE**

For sending, DATA = 1 to request machine name; DATA = 3 to request software version number. EXTENDED DATA - set to 0.
The PC sends this instruction to the machine. The machine relies as follows:
If the machine name is requested, the machine replies with DATA = 40 (hex), and EXTENDED DATA = 45 (hex).
If the software version is requested, the machine replies with DATA as the version number before the decimal point, and EXTENDED DATA is the value following the decimal point. For example, for version 3.4, the machine replies with DATA = 03 (hex), and EXTENDED DATA = 04 (hex).


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**LIMITED WARRANTY**

Kramer Electronics (hereafter *Kramer*) warrants this product free from defects in material and workmanship under the following terms.

**HOW LONG IS THE WARRANTY**

Labor and parts are warranted for three years from the date of the first customer purchase.

**WHO IS PROTECTED?**

Only the first purchase customer may enforce this warranty.

**WHAT IS COVERED AND WHAT IS NOT COVERED**

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1. Any product which is not distributed by Kramer, or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the web site www.kramerelectronics.com.
2. Any product, on which the serial number has been defaced, modified or removed.
3. Damage, deterioration or malfunction resulting from:
   - i) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature
   - ii) Product modification, or failure to follow instructions supplied with the product
   - iii) Repair or attempted repair by anyone not authorized by Kramer
   - iv) Any shipment of the product (claims must be presented to the carrier)
   - v) Removal or installation of the product
   - vi) Any other cause, which does not relate to a product defect
   - vii) Cartons, equipment enclosures, cables or accessories used in conjunction with the product

**WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR**

We will pay labor and material expenses for covered items. We will not pay for the following:

1. Removal or installations charges.
2. Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3. Shipping charges.

**HOW YOU CAN GET WARRANTY SERVICE**

1. To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
2. Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
3. For the name of the nearest Kramer authorized service center, consult your authorized dealer.

**LIMITATION OF IMPLIED WARRANTIES**

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

**EXCLUSION OF DAMAGES**

The liability of Kramer for any effective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:

1. Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
2. Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.
**NOTE**: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.
This equipment has been tested to determine compliance with the requirements of:

| | |
|---|---|
| EN-50081: | "Electromagnetic compatibility (EMC);<br>generic emission standard.<br>Part 1: Residential, commercial and light industry" |
| EN-50082: | "Electromagnetic compatibility (EMC) generic immunity standard.<br>Part 1: Residential, commercial and light industry environment". |
| CFR-47: | FCC Rules and Regulations:<br>Part 15: “Radio frequency devices<br>Subpart B – Unintentional radiators” |

**CAUTION!**

- ⌧ Servicing the machines can only be done by an authorized Kramer technician. Any user who makes changes or modifications to the unit without the expressed approval of the manufacturer will void user authority to operate the equipment.
- ⌧ Use the supplied DC power supply to feed power to the machine.
- ⌧ Please use recommended interconnection cables to connect the machine to other components.



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